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COMMERCIAL HVAC DESIGN/BUILD

Ground-floor Involvement Helps to Ensure Successful HVAC Installation

EMCOR Services New England Mechanical's role in the Chapel Haven REACH project demonstrates how a construction project can benefit from a mechanical contractor's early participation.

by Matthew Mullen, P.E., BEAP, LEED AP, CBCP

DESIGN/BUILD ★ awards
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Chapel Haven is a nationally recognized private special education and transitional living program teaching adults with cognitive and social disabilities how to live independent lives in New Haven, Connecticut. The REACH Building was a new four-story 32,500 sq.ft. residential and educational facility with three upper floors of dormitory-type suites each with kitchens and common spaces. The main floor includes classrooms, gathering spaces, and administration space. The building was a light metal frame building with low floor to floor heights required to comply with zoning requirements.

EMCOR Services New England Mechanical's role in the Chapel Haven REACH project demonstrates how a construction project can benefit from a mechanical contractor's early participation.

SLAM — a uniquely integrated firm offering planning, design, structural engineering, interiors and construction management — was hired in February of 2017 to provide master planning, programming, design and construction for a multiphase project to transform the Chapel Haven New Haven campus. The first phase of this project was the REACH Building, a new four-story 32,500 sq.ft. residential and educational facility.

The project challenge was to masterplan, program, design, and get zoning approvals and complete construction by July 2018, or risk losing a significant donation. SLAM recognized they needed to team with key trades early in the design phase in order to meet the aggressive schedule while remaining within budget. EMCOR Services New England Mechanical (NEMSI) was selected to provide design assist, estimating, construction methodology review. NEMSI began participating in design meetings within six weeks after project award to SLAM.

A key project goal was to incorporate high-efficiency HVAC systems or renewable energy into the overall campus master plan. The REACH building mechanical systems design was well underway when NEMSI was selected. The initial project HVAC design included an air-cooled variable refrigerant flow (VRF) system utilizing ducted fan coils, a Dedicated Outdoor Air System (DOAS) and finned tube radiation around the perimeter.

The REACH Building, a new, four-story residential/educational facility.

In order to keep the engineering team focused on completing the building drawings, NEMSI was tasked with evaluating methods to enhance the overall REACH building and campus energy efficiency. NEMSI provided conceptual designs, budgets, and operating costs for campus wide solar

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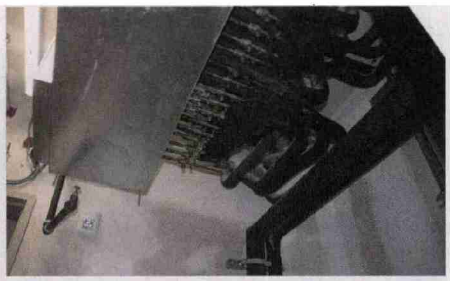
The EMCOR New England Mechanical crew used panelized construction, which is fabricated off-site, throughout the interior.

photo voltaic systems, geothermal systems, micro-cogeneration and even third-party energy system providers.

The project challenge was to masterplan, program, design, and get zoning approvals and complete construction by July 2018 or risk losing a significant donation.

The evaluation determined the micro-scale cogeneration option was the most cost effective and efficient option for the REACH and future buildings. The water-cooled approach enabled increased heat recovery in the REACH building and also on the entire campus when the future building is interconnected through future underground piping. The interconnection between the two larger buildings will allow for the installation of micro cogeneration units in the future building. With the interconnection, the heat generated by the micro cogeneration units will help heat both buildings while offsetting some of the campus electrical costs.



One of the Mitsubishi Electric City-Multi heating and cooling systems in place.

NEMSI worked with the architectural design team to carve out small rooms with doors where vertical units could be installed rather than horizontal units.

The micro-scale cogeneration required changing from an air-cooled VRF system to a water-cooled VRF system. The air-cooled condensing units were replaced by a roof-mounted

High efficiency LAARS boilers.

PROJECT AT-A-GLANCE

Chapel Haven REACH Building living and educational facility, New Haven, Ct.
Size: 32,500 sq.ft.
Customer: Leland Torrence Enterprises, LLC
Mechanical contractor: EMCOR Services New England Mechanical, South Windsor, Ct.
Contract amount: $1.6 million
Duration: October 2017 through July 2018
Insulation: KMK Insulation
Air Balancing: Air Balancing Service Co.
Crane Service: Aero Crane Service
Products:
Mitsubishi City-Multi systems
LAARS boilers

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Custom console heating/cooling unit.

cooling tower for heat rejection and high efficiency condensing boilers as a heat source while the VRF refrigeration piping and indoor fan coils portion continued to be used.

The engineer's initial design utilized horizontal VRF fan coils above sheet rock ceilings using access doors for service and maintenance. NEMSI suggested this approach would hinder access to the units, and in our experience, the ceiling soon becomes soiled near the access doors due to routine service. NEMSI worked with the architectural design team to carve out small rooms with doors where vertical units could be installed instead of the horizontal units. The vertical units provided better service access and eliminated the ceiling soiling concerns. NEMSI worked closely with the design team to make the vertical units serviceable and meet the strict project acoustic performance goals necessitated by the residents' disabilities.

Wall-mounted units inside each apartment.

NEMSI provided regular mechanical budget updates as the engineering team completed their design. Value engineering for all disciplines became necessary to maintain the overall project budget. As the architectural design included highly efficiency glazing, NEMSI suggested the elimination of the perimeter radiation system and installing diffusers closer to the perimeter windows. The project team accepted this value engineering item.

The micro scale cogeneration required changing from an air-cooled VRF to a water-cooled VRF system.

The project schedule would not allow for the time required for the project engineer to revise their drawings to incorporate the changes. Instead, NEMSI's design/build experience was called upon to incorporate the changes through the project engineer's review of the equipment submittals and coordination drawings prepared by NEMSI. This approach proved vital to meeting the project schedule during coordination.

The project structural systems utilized on the REACH building provided for quick erection of the building to help meet the project schedule. The combination of a relatively low floor-to-floor height (dictated by Planning and Zoning approvals) with the structural system made for very limited ceiling space. HVAC equipment and electrical distribution panels were co-located in rooms to conserve floor space. Extensive use of sheet rock ceiling in the resident spaces also limited accessibility to distribution systems.

The project schedule would not allow for any coordination mistakes. NEMSI led the field trade coordination efforts using our three dimensional drafting and coordination systems. Code required and service access clearances were able to be maintained throughout in addition to fitting in all the building systems.

To minimize service access above the sheet rock ceiling and to help with tight ceiling space, NEMSI suggested using copper domestic water piping with isolation valves above the corridor ceiling and then PEX tubing for plumbing distribution to the individual plumbing fixtures in each residential unit to conserve space above the sheet rock ceilings.

To minimize service access above the sheet rock ceiling and to help with tight ceiling space, NEMSI suggested using copper domestic water piping with isolation valves above the corridor ceiling, and PEX tubing for plumbing distribution.

The REACH building opened as scheduled in July 2018, including the changes described, with excellent occupant comfort throughout all seasons. The decision to engage NEMSI during the early phases of the project was vital meeting the project schedule while providing efficient and cost effective building mechanical systems. NEMSI is also working in a similar role with the same project team working on the second phase of the project.

EMCOR Services New England Mechanical was subcontracted through an open book. There was a guaranteed maximum price of $1,642,439 for the HVAC and plumbing systems for the project. The project ran from October, 2017 through July, 2018. **CB**